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EXAMINER

KANG, INSUN

ART UNIT

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2193

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/765,916	Applicant(s) CANUT ET AL.	
	Examiner INSUN KANG	Art Unit 2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2193

DETAILED ACTION

1. This action is in response to the amendment filed on 2/14/2011.
2. Claims 1-31 are pending in the application.

Claim Rejections - 35 USC § 112

3. Applicant's arguments, filed on 2/14/2011, with respect to claims 1-31 have been fully considered and are persuasive. The rejection of claims 1-31 has been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 8-16 and 21-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pieper et al (US 2003/0005419) in view of Cain et al ("Portable Software Library Optimization," 2/1998) hereinafter referred to as "Cain."

Regarding claim 1:

Pieper et al. disclose: a method of optimizing a software program for a target processor to meet performance objectives, where the software program is coded in a high-level Language (par. 0019; par. 0020), the method comprising the steps of: (a) optimizing the software program such that, determining a first performance profile for the first optimized form of the

Art Unit: 2193

software program, and comparing the first performance profile with the performance objectives (par. 0020; 0030).

Pieper et al. do not explicitly disclose that a resulting first optimized form of the software program is completely independent of the target processor and is at least partially coded in the high-level language. However, Cain teaches that such a portable optimized high-level source code was known in the art of software development and optimization, at the time applicant's invention was made, to provide portability to different platforms (i.e. section 1, page 1, second paragraph). It would have been obvious for one having ordinary skill in the art of computer software development and optimization to modify Pieper's disclosed system to incorporate the teachings in Cain. The modification would be obvious because one having ordinary skill in the art would be motivated to maintain portability of programs that are optimized in high-level target independent code in Pieper.

Pieper et al. further discloses:

(b) based on results of comparing the first performance profile with the performance objectives, if the performance objectives are not met by the first optimized form of the software program, then optimizing the first optimized form of the software program such that a resulting second optimized form of the software program includes at least one portion that is dependent on the target processor and is coded in the high-level language, wherein the at least one portion of the second optimized form of the software program is less than an entirety of the second optimized form (par. 0031, 0020; par. 0045);

Art Unit: 2193

Pieper et al. do not explicitly disclose flagging at least one portion to indicate that the at least one portion is dependent on the target processor if the first optimized form of the software program is optimized to create the second optimized form of the software program.

However, Cain teaches that using flags was known in the art of software development and optimization, at the time applicant's invention was made, to mark or identify some portions or whole code as an event of some type or having a special purpose or capability (“#include directive is used to retrieve the desired system-specific API,” page 7). It would have been obvious for one having ordinary skill in the art of computer software development and optimization to modify Pieper’s disclosed system to flag the modified target dependent code. The modification would be obvious because one having ordinary skill in the art would be motivated to identify the target specific code for efficient optimization and portability (page 6-7) as taught by Cain.

Pieper further discloses wherein the acts of optimizing are performed such that the first and second optimized forms of the software program are progressively more dependent on the target processor (i.e 0030;0031).

Regarding claim 2:

The rejection of claim 1 is incorporated, and further, Pieper et al. disclose: (b) determining a second performance profile for the second optimized form of the software program, and comparing the second performance profile with the performance objectives (par. 0032; 0044) as claimed.

Art Unit: 2193

Regarding claim 3:

The rejection of claim 2 is incorporated, and further, Pieper et al. disclose:

-optimizing the second optimized form of the software program such that a resulting third optimized form of the software program is at least partially dependent on the target processor and includes portions coded in a low-level language of the target processor (par. 0031) as claimed.

Regarding claim 9:

Pieper et al. further disclose the act of implementing reference code comprises code profiling (par. 0031, 0042 ; 0046 ; 0048 ; 0049 ; 0052) as claimed.

Regarding claim 8, this claim is another version of the claimed method discussed in claim 9, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth the above.

Regarding claim 10:

The rejection of claim 1 is incorporated, and further, Pieper et al. disclose :

-the act of optimization predicted to improve resulting assembly code (“In generating the code, generator modifies the code such that code reflects scheduling and other low-level optimizations of the code, which are dependent on the target processor architecture,” 0031; 0032; 0009).

Regarding claim 11:

The rejection of claim 1 is incorporated, and further, Pieper et al. disclose the act of tuning low-level functions (0031) as claimed.

Regarding claim 12:

Art Unit: 2193

The rejection of claim 1 is incorporated, and further, Pieper et al. disclose the act of manual assembly optimization. Hand-coded assembly for optimized performance is necessary for performance critical routines such as graphics or math library routines as they often must access low-level machine instructions for optimal execution performance. Therefore, accordingly, Pieper et al. anticipate this claim. See also 0009 and 0018.

Regarding claim 13:

The rejection of claim 1 is incorporated, and further, Pieper et al. the act of feature tuning (0031; 0032).

Per claim 27:

Pieper et al. further discloses: wherein the second optimized form of the software program includes the at least one portion that is dependent on the target processor and another portion that is independent of the target processor (par. 0031, 0020; par. 0045).

Per claim 28:

Pieper et al. further discloses: wherein the act of optimizing the first optimized form of the software program uses a subset of the first optimized form (par. 0031, 0020; par. 0045).

Per claims 14-16, 21-26, 29, and 31, they are the computer-readable medium versions of claims 1-3, 8-13, 27, and 28, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 1-3, 8-13, 27, and 28 above.

Per claim 31, it is the system version of claim 1, respectively, and is rejected for the same reasons set forth in connection with the rejection of claim 1 above.

Art Unit: 2193

6. Claims 4-7 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pieper et al (US 2003/0005419) in view of Cain et al (“Portable Software Library Optimization,” 2/1998) hereinafter referred to as “Cain” and further in view of Kum et al. (0-7803-5041-3/99, IEEE).

Regarding claim 4:

The rejection of claim 1 is incorporated, and further, Pieper et al. and Cain do not explicitly teach a floating-point implementation. However, Kum et al. disclose deriving a floating point implementation (pg 2163, introduction, par. 3, “the ranges of floating point variables are estimated by the simulation of the range estimation program that is automatically generated from the original floating-point version,” see also Figure 1) for the purpose of automatic scaling of all numbers so that the numbers use the full word length available and for the purpose of reducing the risk of overflow. Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate the teachings of Kum et al. to the system of Pieper et al and Cain. The modification would be obvious to include the floating-point implementation because of the automatic scaling of each number to use the full word length of the mantissa so that accurate representation of numbers can be obtained while minimizing the risk of overflow and quantization errors (pg 2163, introduction, par. 3).

Regarding claim 5:

The rejection of claim 1 is incorporated, and further, Pieper et al. and Cain do not explicitly teach a fixed point implementation. However, Kum et al. disclose the method of claim 1 in which step (a) comprises the act of deriving a fixed point implementation so that “assembly

Art Unit: 2193

coding and manual scaling can be avoided and the translated C programs are executed very efficiently” in fixed-point DSPs (pg 2163, introduction, lines 1-15). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate the teachings of Kum et al. to the system of Pieper et al and Cain. The modification would be obvious to include the fixed-point implementation so that round-off errors can be prevented and target dependent scaling shift can be minimized while obtaining fast real-time processing with less power and memory usage (pg 2163, introduction, lines 1-15).

Regarding claim 6:

The rejection of claim 5 is incorporated, and further, Pieper et al. and Cain do not explicitly teach the act of processing qualification. However, Kum et al. further disclose the act of processing qualification (Introduction, par.3; simulation-based integer word-length determination, pg 2165, shift reduction, par. 10; pg 2163, par. 6; pg 2166, Concluding remarks) so that cost effective and high quality fast real-time processing with less power and memory usage can be obtained while reducing quantization noise (Introduction, par.3; simulation-based integer word-length determination, pg 2165, shift reduction, par. 10; pg 2163, par. 6; pg 2166, Concluding remarks). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate the teachings of Kum et al. to the system of Pieper et al and Cain. The modification would be obvious to include the act of processing qualification for the purpose of high quality processing with minimized quantization noise.

Regarding claim 7:

The rejection of claim 5 is incorporated, and further,, Pieper et al. and Cain do not explicitly teach the act of implementation sizing. However, Kum et al. further disclose the act of

Art Unit: 2193

implementation sizing (abstract; Introduction, pg 2163, par.3; pg 2163, simulation-based integer word-length determination) by program-profiling results (pg 2164-2165, Sift reduction) so that estimation of code size for the target can be obtained and the risk of overflow can be prevented. Therefore, it would have been obvious to a person having ordinary skill in the art to incorporate the teachings of Kum et al. to the system of Pieper et al and Cain. The modification would be obvious to include the act of implementation sizing for the purpose of code size estimation so that the risk of overflow can be prevented (pg 2164-2165, Sift reduction).

Per claims 17-20, they are the computer-readable medium versions of claims 4-7, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 4-7 above.

Response to Arguments

7. Applicant's arguments filed on 2/14/2011 have been fully considered but they are not persuasive.

The applicant states that in Pieper, the entirety of code 64 is target dependent. Therefore, Pieper even with the purported modification based on Cain clearly does not disclose or suggest a second optimized form of a software program having at least one target dependent portion that is less than an entirety, and that is coded in high-level language.

In response, the optimized code produced by the optimization processes 58 based on execution profile data 78 generated by execution analysis process 76 is “**substantially independent**” of the target processor (0030). “Substantially independent” code is interpreted as not “completely independent” of the target processor which indicates some portion is not target

Art Unit: 2193

independent. See Applicant's remark in the appeal brief filed on 4/2/2007 and the decision made by the board on 2/27/2009.

The applicant states that Cain does not disclose flagging. Cain does not disclose or suggest that any act of flagging is conditioned upon whether the first optimized form of the software program is optimized to create the second optimized form of the software program. Note the limitation if in the claims. There is nothing in Cain that discloses or suggests that the `#if-define` is a flag that is conditioned upon whether the first optimized form of the software program is optimized to create the second optimized form of the software program.

In response, it appears that the specific portion in the instant specification that explains what the flagging means is located at page 24: "Although the pragmas and intrinsics tend to detract from the portability, those parts of the code may be encapsulated and isolated, with the use of `#if-define` or other such conditional compiling flags, target compiler dependent flags can be integrated into the code so that it is possible to recompile the same application for all the targets to be addressed." Cain clearly discloses the `#ifdef` directives that are for "compile-time conditional code compilation" and "used to retrieve the desired system-specific API," (page 7)." The use of `#ifdef` flag for target specific code in Cain is also to achieve software portability by encapsulating the system-specific sections in Cain's portable software optimization (i.e. pages 3, page 7). Therefore, the modification to use the `#ifdef` flag to encapsulate the target-dependent portion in Pieper would be obvious to a person having ordinary skill in the art to identify the target specific portion of Pieper's optimized code for portability as taught by Cain.

Conclusion

8. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **INSUN KANG** whose telephone number is (571)272-3724. The examiner can normally be reached on M-R 7:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis A. Bullock, Jr. can be reached on 571-272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2193

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Insun Kang/
Primary Examiner, Art Unit 2193